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IS 12254 (1993): Polyvinyl Chloride (PVC) Industrial Boots
[CHD 19: Footwear]

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(पहला पुनरीक्षण)

Indian Standard

POLYVINYL CHLORIDE (PVC) INDUSTRIAL BOOTS — SPECIFICATION

(First Revision)

UDC 685·315·4 [678·743·22]

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1993 **Price Group 6**

Footwear Sectional Committee, CHD 019

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

Polyvinyl chloride (PVC) boots are meant to protect feet, ankles and knees against rains during monsoon and while working in slushy area. Sush boots are also recommended for light duty purpose in tanneries, food and beverage industries, sewage treatment plants, petrochemical, cement and pharmaceuticals industries, garbage disposal in municipal corporations and in building construction work, because polyvinyl chloride has very good resistance to water, alcohols, acids and alkalies.

This standard was first published in 1988 and in which considerable assistance was derived from ISO 4643 : 1980 'Plastic moulded footwear — Polyvinyl chloride industrial boots — Specification', issued by International Organization for Standardization (ISO), Geneva. In view of the developments in this field and experience gained in the plastic moulded footwear industry the concerned technical committee has decided to revise this standard and also harmonize it with ISO 4643 : 1980.

In the process of harmonization suitability of the product to Indian condition and users was kept in view alongwith its performance when assessed as per this standard. This standard is now technically equivalent to ISO 4643 : 1980. However the requirements given in **5.5**, **5.7**, **5.12** and **5.15** are in addition to the requirements prescribed in ISO 4643 : 1980. The requirement under **5.13** is not an obligatory requirement, since such tests are generally not required because of the tropical climate of India.

In this revision, PVC industrial boots for women have also been included in the scope of this standard. The specified values for sole thickness, volatility, tensile properties, elongation at break for upper material, leg height of boots and hardness have been modified and additional requirements for performance and cold flex resistance have been introduced in the standard as optional requirements depending on the buyer's need.

The composition of the committee responsible for the formulation of this standard is given at Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

POLYVINYL CHLORIDE (PVC) INDUSTRIAL BOOTS — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements, methods of sampling and tests for polyvinyl chloride boots of styles — ankle with minimum four eyelets at each face, half knee, short knee and knee for general industrial use for men and women and thigh high boots for men. The boots may be either fabric lined or unlined.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2050 : 1991 shall apply.

4 MATERIALS

4.1 Fabric (for Lined Boots)

In the case of lined boots, the fabric shall be knitted and free from visible defects. The breaking strength of the natural/synthetic fabric shall be not less than 150 N in both warp and weft direction when tested in accordance with the method given in IS 1969 : 1985.

4.2 Eyelets and Laces (Applicable for Ankle Boots)

4.2.1 Brass coated steel or aluminium eyelets of size (collar diameter) 10 mm as given in Table 1 of IS 5041 : 1978 shall be used.

4.2.2 The laces shall conform to the requirements given below when tested in accordance with IS 4778 : 1982:

Length	65 ± 5 cm
Breaking load	23 kg, *Min*

4.2.3 The black laces shall also be free from sulphur dyes when tested in accordance with Annex B.

4.3 Steel Toe Caps

Protective steel toe caps conforming to type 2 of IS 5852 : 1992 shall be used.

5 REQUIREMENTS

5.1 Shape and Design

5.1.1 The boots of various styles shall conform to the shape and design shown in Fig. 1, in absence of any other shape and design as agreed to between the purchaser and supplier.

5.2 Soling Pattern

The soling shall not include continuous lateral tread patterns or any other features, such as unradiused corners at the base of the sole pattern, which may accelerate or cause premature crack formation.

NOTE — The pattern of sole may have significant effect on the formulation of premature cracks and safety on slippery surfaces.

5.3 Thickness

5.3.1 The thickness of polyvinyl chloride compound shall be not less than 1·0 mm at any point round the top circumference of the boot upper excluding the raised top edge reinforcement, and not less than 3·0 mm at any point on the lowest part of the upper adjacent to the soling or heel join.

5.3.2 The thickness of different components of PVC boots shall conform to the thickness specified for the same in Table 1, when tested in accordance with IS 12240 (Part 1) : 1988.

5.4 Hardness

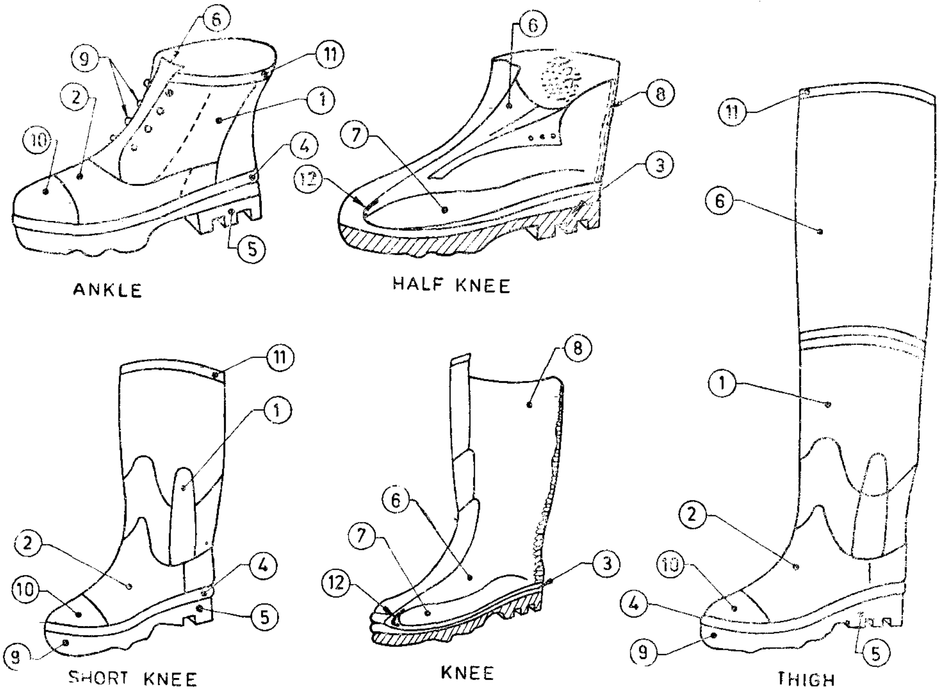
The hardness of the materials shall be measured in not less than 4 days but not more than 90 days after moulding and when tested in accordance with the method prescribed in IS 12240 (Part 2) : 1988, after conditioning, shall comply with the requirements as stipulated in Table 2.

For soling compound, all measurements shall be taken on the prepared surface of a test piece which was adjacent to the wearing surface of the sole and which does not include any filler or upper compound, all measurements shall be taken on actual outer surface of boot leg. The minimum thickness of a test piece to be taken for hardness testing shall be 6 mm.

Table 1 Thickness Requirements of Various Components

(*Clause* 5.3.2)

Sl No.	Component	Thickness, *Min*, mm Over Cleats		Thickness, *Min*, mm Between Cleats	
		Men	Women	Men	Women
(1)	(2)	(3)	(4)	(5)	(6)
i)	Boot upper	1·5 of which not less than 1·0 shall be polyvinyl chloride compound			
ii)	Foxing strip				
	a) At the heel	4·0	4·0	4·0	4·0
	b) Elsewhere	3·0	3·0	3·0	3·0
iii)	Boot bottom				
	a) full thickness	12·0	10·0	7·0	5·0
	b) outsole only	8·0	6·0	3·0	2·5
iv)	Heel				
	a) full thickness	25·0	20·0	19·0	14·0
	b) Wearing surface to filler block	9·0	4·0	3·0	2·5



1. Upper of PVC
2. Vamp
3. Filler
4. Foxing Strip
5. Heel
6. Hip-Top
7. Insole
8. Leg Lining
9. Outsole
10. Toe Cap
11. Top Binding
12. Steel Toe Caps

NOTE — This illustration is diagrammatic only and is not intended to illustrate detail of design.

FIG. 1 TYPICAL POLYVINYL CHLORIDE BOOTS

NOTE — For upper hardness testing, section of boot leg material may be built up to achieve the minimum thickness.

Table 2 Hardness Requirements of Various Components

(*Clause* 5.4)

Sl No.	Component	Hardness, Shore A Durometer
(1)	(2)	(3)
i)	Upper	42 to 59
ii)	Sole and heel	50 to 67

NOTE — The hardness in Shore A durometer and IRHD are comparable in the range of 30 to 95. However, in case of any dispute, the same shall be determined in IRHD for which the values specified will remain unchanged.

5.5 Relative Density

The relative density of the material after moulding shall be not more than 1·25 when tested in accordance with the method prescribed in IS 12240 (Part 3) : 1988.

5.6 Volatility

When tested in accordance with IS 12240 (Part 2) : 1988 using test pieces of PVC compound 2·0 ± 0·1 mm in thickness taken from the upper and soling components respectively, the mean loss in mass of the three test pieces shall not exceed 2·0 percent for either the upper or the soling compound.

5.7 Lead Content

The lead content (as Pb) shall not be more than 2 ppm when determined in accordance with the method prescribed in IS 12240 (Part 5) : 1988.

5.8 Tensile Requirements

5.8.1 The stress at 100 percent elongation at break of the upper and the sole shall be determined in accordance with the method prescribed in IS 12240 (Part 6) : 1988 using dumb-bell test piece taken from the products. A smaller dumb-bell test piece may be used if size makes this necessary, but in this case the size of the dumb-bell shall be stated when the results are expressed.

5.8.2 The direction of the test shall be along the sole and up the leg. Where practicable, test pieces shall be 2·0 ± 0·2 mm thick; if necessary, in order to ensure that no fabric is included in the test pieces, thinner test pieces shall be used and the thickness used shall be stated when expressing the results.

5.8.3 In the test for stress at 100 percent elongation, if the average of the results is outside, but some results are inside the appropriate range, specified in Table 3, five further test pieces shall be tested. The material shall be deemed to comply with the requirements if the average of all ten results is within the appropriate range.

5.8.4 Five test pieces shall be used for each test and the median value of each group of five test results shall be in accordance with Table 3.

Table 3 Tensile Properties of Plastic Components

(*Clauses* 5.8.3 *and* 5.8.4)

Sl No.	Component	Stress at 100 Percent Elongation, MPa	Minimum Elongation Break, Percent
(1)	(2)	(3)	(4)
i)	Upper	1·3 to 4·6	250
ii)	Sole	2·1 to 5·0	300

5.8.5 In case of a lined boot, the lining shall be removed before carrying out test. This may be carried out by the careful use of a minimum amount of suitable solvent, such as methyl ethyl ketone or a leather splitting machine.

5.9 Resistance to Cut Growth (Flexing Test) for Sole

When parts of sole are tested in accordance with the method prescribed in IS 12240 (Part 7) : 1988 the cut growth shall not be more than 300 percent after the test piece is subjected to 150 000 flex cycles.

The test pieces shall be cut parallel to the centre line of the sole (*see* Fig. 2). Thickness of the soling compound shall not be less than 50 percent of the test piece thickness. Measurement of cut growth shall be confined to the outside surface of the test piece depending on the conditions for use. The buyer may also ask for the temperature of −5 ± 2°C at which the test may be carried out, while the specified values will remain the same.

5.10 Resistance to Flexing for Upper

When parts of the upper are tested in accordance with the method prescribed in IS 12240 (Part 8) : 1988 no cracking shall occur during 150 000 flex cycles.

5.11 Leg Height

The height of boots shall be as given in the col 3 and 4 of Table 4 or as agreed to between the purchaser and the supplier. The height shall be measured on inside at the back of the boots from the insole to the top including any flexible extension.

Table 4 Heights of the Boots

(*Clause* 5.11)

Sl No.	Style of Boots	Height in mm	
		For Men	For Women
(1)	(2)	(3)	(4)
i)	Ankle	115-179	115-152
ii)	Half knee	180-239	153-203
iii)	Short knee	240-329	204-279
iv)	Knee	330-429	280-380
v)	Thigh, *Min*	700	580

5.12 Leakage Resistance

The finished boots shall show no leakage with air at a pressure 0·015 MPa forced into the boots when tested in accordance with **5.12.1**.

5.12.1 Seal the top of the boots. Force air into the boots to a pressure of 0·015 MPa. Immerse the boots in water to 75 mm, *Min* from the top surface of water to the top of boots for 6 h and examine for escape of air.

5.13 Cold Flex Temperature

5.13.1 If required by a purchaser the boots shall also pass cold flex temperature test when tested in accordance with the method prescribed in Annex C. The cold flex temperature shall not be above −25°C.

5.13.2 A graph shall be prepared showing the relationship between deflection and temperature, and from this the temperature at which the deflection is 200° shall be determined. A deduction of 0·5°C shall be made for each 0·03 mm of the thickness of the test piece above 1·30 mm, and an addition of 0·5 °C for each 0·03 mm of thickness below 1·27 mm.

5.13.3 The arithmetic mean of two results shall be recorded as the cold flex temperature of the material under test.

NOTE — This test is generally not applicable in places, where the temperature does not go below 0°C. This is an optional requirement and shall be made applicable as and when agreed to between the supplier and the purchaser.

5.14 Finish

The boots shall be free from injurious folds, wrinkles, blisters, embedded foreign matters, excessive surface markings caused by dirty and damaged moulds. The finish of boots shall be in accordance with sound manufacturing practices and satisfy the approved sample, if provided by the purchaser.

5.15 Performance

If required by the purchaser the boots may also be fitted with protective steel toe caps. When such boots are subjected to the impact test as per method given in Annex D for evaluating the safety factor of the boots, they shall withstand a blow of 14 kgfm. They shall be considered to have passed the test, if the clearance inside the boots at the moment of the maximum depression, when subjected to impact test, is 13·5 mm *Min*.

6 MARKING AND PACKING

6.1 Marking

The following particulars shall be marked on each boot:

a) Name of the manufacturer or its recognised trade-mark, if any;

b) Size No.;

c) Batch No., and

d) Month and year of manufacture.

6.2 Packing

Each boot may be wrapped in tissue paper and packed as agreed to between the purchaser and the manufacturer.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 The method of sampling, drawing representative samples of the boots and the criteria for conformity shall be as prescribed in IS 6368 : 1971.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
196 : 1966	Atmospheric conditions for testing (*revised*)
1969 : 1985	Method of determination of breaking wool and elongation at break woven textile fabrics (*second revision*)
2050 : 1991	Glossary of terms relating to footwear (*first revision*)
4778 : 1982	Specification for cotton laces for footwear (*first revision*)
5041 : 1978	Specification for footwear and stationary eyelets (*first revision*)
5852 : 1992	Protective steel toe caps for footwear—Specification (*second revision*)
6368 : 1971	Method for sampling of rubber and rubber combination footwear
12240 : 1988	Methods of test for polyvinyl chloride boots:
(Part 1)	Measurement of thickness
(Part 3)	Determination of relative density
(Part 4)	Determination of volatility
(Part 5)	Determination of lead content
(Part 7)	Flexing test resistance to cut growth for soling material
(Part 8)	Resistance to flexing for polyvinyl chloride upper material

ANNEX B

(*Clause* 4.2.3)

METHOD OF TEST FOR FREEDOM FROM SULPHUR DYES

B-1 PROCEDURE

B-1.1 Boil the laces in alkaline hydrosulphite solution for one minute. If the shade is reduced to pale brown or yellow colour and on oxidation restored to the original colour, sulphur dyes shall be suspected to be present.

B-1.2 For confirmation, boil the laces in acidic stannous chloride solution in a test tube covered with a piece of filter paper moistened with lead acetate. A blackish/brown stain with metallic lustre confirms the presence of dyes.

ANNEX C

(*Clause* 5.13.1)

METHOD OF TEST FOR COLD FLEX TEMPERATURE

C-1 PRINCIPLE

An observation of torque and angle of deflection is made after an arbitrarily fixed time of load application. This procedure is employed at single temperatures or at selected temperature intervals over a range specified for the material to be tested.

NOTES

1 It is necessary that the duration of load application be arbitrarily fixed and the values of angles of deflection be limited because of the known non-linear characteristics of plastics and their tendency to creep.

2 Comparison between values of stiffness in torsion may be made only when the values have been obtained using test specimens of the same thickness and at the same span and approximately at the same angle of deflection.

C-2 APPARATUS

C-2.1 Testing Machine

Capable of exerting a torque sufficient to deflect a test specimen with a span between 35 and 55 mm. A schematic diagram of a machine suitable for this test is shown in Fig. 2.

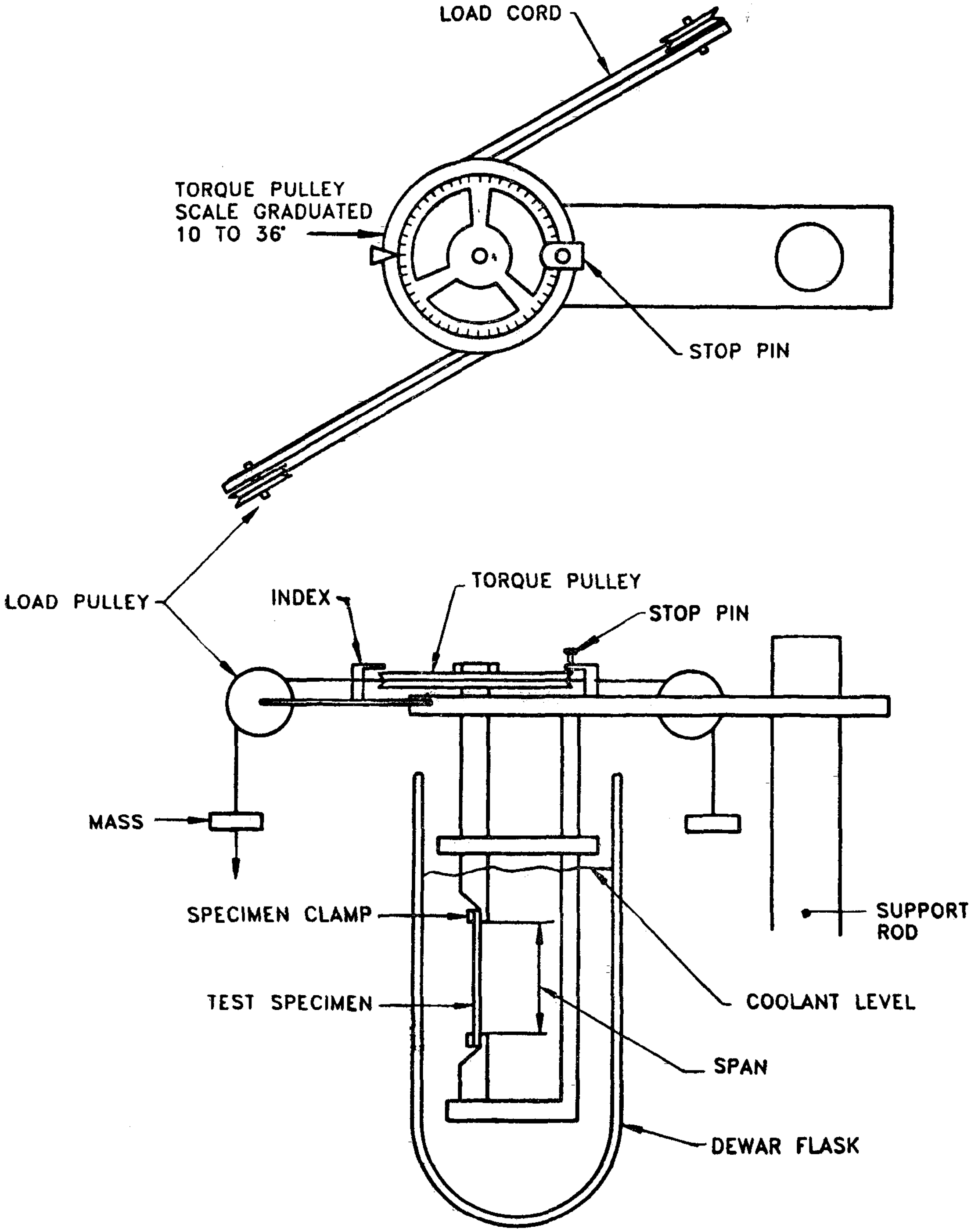


FIG. 2 TORSION TESTER

C-2.2 Different Weights

To vary the amount of torque depending on the stiffness of the specimen and its span. It is recommended that the actual amount of torque being applied by any given combination of weights, torque pulley and shaft bearings be determined by periodic calibration.

NOTE — For operation at low temperatures, it is recommended that the shaft of the machine be provided with a heated collar next to the lower bearing to prevent the formation of ice.

C-2.3 Dewar Flask or Thermal Chamber — of suitable dimensions.

C-2.4 Thermometer

Accurate to 1°C and having the necessary range. The bulb should be placed in close proximity to the test specimen.

C-2.5 Timer — accurate to 0·1 second.

C-2.6 Heat Transfer Medium

For normal laboratory purposes, a substance which is liquid over the desired temperature range is used for the heat-transfer medium, provided it has been shown that the liquid does not soften or otherwise affect the test specimen. With special precautions, a gaseous medium may be used (*see* Note). Good stirring shall be ensured by appropriate means, during cooling and heating.

NOTES

1 Among the liquids found useful are acetone, ethanol, butanol, *n*-hexane, silicone oil and a mixture of methyl phosphate and water in the ratio of 87 to 13 (V/V). For low temperature to —70 °C a mixture by volume of 50 parts ethanol, 30 parts ethylene glycol and 20 parts water may be found useful. With a gaseous heat-transfer medium, care should be taken to ensure that sufficient time is allowed for the test specimen to reach thermal equilibrium.

2 For cooling, a refrigerator or a dry ice chest or both, according to the desired temperature, may be used. For heating, an electric heater may be used.

C-2.7 Micrometer

A dead-weight dial-type micrometer accurate to at least 0·01 mm shall be used for thickness and width measurements. The pressure exerted on the specimen shall be within the limits of 10 to 30 kPa. An instrument accurate to at least 0·1 mm shall be used for measuring the span.

C-3 TEST SPECIMENS

C-3.1 Dimensions

Test specimens shall be 70 ± 10 mm in length, 6·0 to 6·4 mm in width, and may have two holes for fixing in the clamps of the machine. Such holes shall have elongated shapes in the direction of the length of the test specimen. In an isotropic sheet the test specimens shall be cut along the two main directions.

The thickness of the test specimen shall be generally between 1 mm and 5 mm. This range is usually sufficient to test materials of various stiffnesses.

NOTE — In some cases it may be necessary to increase the width to 13 mm.

C-3.2 Number

Two test specimens of each material shall be tested.

C-3.3 Conditioning

Specimens to be tested shall be conditioned at 27 ± 2°C and 65 ± 5 percent relative humidity for 24 h in accordance with IS 196 : 1966.

C-4 PROCEDURE

C-4.1 Measure the span. Measure the thickness and the width of the test specimen at three points along the span. If the individual values differ by more than 0·1 mm, the test piece shall be discarded and another test piece shall be taken. Calculate the mean values of the thickness and the width.

C-4.2 Mount the test piece in the machine (*see* **4.1**). The test specimen shall be placed between the clamps in such a way that its vertical axis coincides with the axis of rotation of the machine. Wedges may be used for this purpose.

NOTE — To prevent effects of tension during cooling, it is recommended that the test specimen be fixed only when the temperature has fallen at least as low as the lowest point it is intended to study.

C-4.3 Place the thermometer (*see* **4.4**) in position.

C-4.4 Fill the Dewar flask or the thermal chamber with the heat transfer medium, the temperature of which should be somewhat below the lowest temperature of the range to be studied. Place the flask in position on the machine.

C-4.5 Start the agitator. When the desired temperature and thermal equilibrium have been reached, take the first reading as described in **C-4.7**.

C-4.6 By intermittent use of the heater bring the test temperature above the initial test temperature, if applicable.

C-4.7 Take readings after the test specimen has been conditioned at each test temperature for

180^{+15}_{-0} s. Weights shall be attached to give the required torque (M), calculated as

$$M = R \Sigma W$$

where

$R = \frac{D_1+D_2}{2}$

D_1 = the diameter, in millimetres of the torque pulley,

D_2 = the diameter, in millimetres of the load cord; and

ΣW = the sum of the two weights, in newtons (N) used to apply the torque.

A reading shall be taken by releasing the torque pulley and noting the angle of deflection, θ, after an interval of 5 seconds. The pulley shall then be returned to the zero position and, if applicable, the procedure shall be repeated at successively higher temperatures. The value of θ and the temperature shall be recorded for each reading.

The testing shall be done in such a way that the angular deflection value falls within the range from 10° to 100°.

If the value of the angle of deflection does not fall within the range given above, the applied torque shall be varied in such a way as to produce a suitable reading. If this is found to be insufficient, a specimen of another thickness shall be taken for testing.

C-5 EXPRESSION OF RESULTS

C-5.1 The stiffness in torsion, expressed as the apparent torsional modulus of elasticity T, for each temperature is given, in MPa, by the equation:

$$T = \frac{917\, L\, M}{b d^3\, \mu\, \theta}$$

or, in a modified form

$$T = k\, \frac{M}{\theta} \text{ and } k = \frac{917\, L}{b d^3\, \mu}$$

where

L = the span, in millimetres;

M = the applied torque, in newton millimetres;

b = the average width of the specimen (the larger cross-sectional dimension), in millimetres;

d = the average thickness of the specimen (the smaller cross-sectional dimension) in millimetres;

μ = value depending on the ratio b/d (intermediate values may be found by interpolation);

θ = the angle of deflection, in degrees;

917 = a dimensional constant in angular degree; and

k = a factor depending on specimen dimensions in angular degrees per cubic millimetre.

The modified equation is recommended for use when repeated tests of the same specimen are being made.

C-5.2 If testing has been done over a wide range of temperatures, plot for each specimen tested the logarithm of stiffness in torsion versus temperature.

Table 5 Values for μ as a Function of b/d

Sl No.	Ratio b/d	μ
(1)	(2)	(3)
i)	1·20	2·64
ii)	1·30	2·82
iii)	1·40	2·98
iv)	1·50	3·13
v)	1·60	3·26
vi)	1·70	3·37
vii)	1·80	3·48
viii)	1·90	3·57
ix)	2·00	3·66
x)	2·25	3·84
xi)	2·50	3·99
xii)	2·75	4·11
xiii)	3·00	4·21
xiv)	3·50	4·37
xv)	4·00	4·49
xvi)	4·50	4·58
xvii)	5·00	4·66
xviii)	5·50	4·72
xix)	6·00	4·77
xx)	6·50	4·81

NOTE — The values in the table are given by the equation

$$\mu = 5{\cdot}33 - 3{\cdot}36\, \frac{d}{b} \left(1 - \frac{d^4}{12\, b^4} \right)$$

C-6 TEST REPORT

The test report shall include the following information:

a) full details necessary for identification of the material, including name, stock or code number, date of manufacture, etc;

b) nominal dimensions of test specimen (span, width, thickness);

c) details of conditioning of test specimen prior to test;

d) heat-transfer medium used;

e) table of data and results (temperature, angular deflection, stiffness in torsion); and

f) plot of the logarithm of the mean value of stiffness in torsion for both test specimens versus temperature (if a wide range of temperature, is used).

ANNEX D

(*Clause* 5.15)

METHOD OF DETERMINATION OF IMPACT VALUE

D-1 REQUIREMENTS

D-1.1 Test Specimen

The boots shall be tested only after a minimum of 24 hours of its manufacture.

D-1.2 The test shall be made on the toe of a size 8 boot, reinforced with steel toe-cap. Other sizes of boots shall be made similarly to the tested boots and the toe-cap shall be made of the same material, treated in the same way and of the size proportionate to the size of the boot in which it is to be used.

D-1.3 Pattern of Boot

The test shall apply only to boots of Type 2.

D-2 TEST MACHINE

D-2.1 The test machine shall be such that a 27·0 ± 0·2 kg weight can be allowed to fall freely on vertical guides from various predetermined heights to strike a cylindrical mild steel plunger, 38 mm in diameter and 145 mm long. The plunger shall be freely supported in a vertical guide, and shall have attached to its lower end a horizontal mild steel bar 115 mm long, 38 mm wide and 10 mm thick. The bar shall be such that it can rest on the toe of the boot in a position specified in **D-4.1**. The upper end of the plunger shall have a mild steel plate 63 mm wide, screwed to it which can be replaced if worn out. The above dimensions shall have a tolerance of ±1 mm.

D-2.1.1 The base of the machine shall be solidly constructed of hardwood, 75 mm thick. To this shall be bolted a metal block 50 mm thick to support the steel plate on which the boot rests (*see* **D-4.2**).

D-3 MEASUREMENT OF IMPACT VALUE

D-3.1 Point of Measurement of Clearance Inside the Boot

The position of point of measurement of clearance inside the boot shall be found by using a size 8 last of the same shape as that on which the boot to be tested was made (*see* Fig. 3). The toe point is found by placing the last on a flat surface so that its inside surface and toe touches two vertical planes at right angles to each other. X is the point of contact of the toe with one of these planes. A line XY is drawn from toe to heel (the heel point can be located by eye with sufficient accuracy) and 28 mm is marked off down this line from the toe to give point A. A line perpendicular to XY is drawn through A cutting the outside edge of the last at P and the inside edge at Q. Q is then marked so that $OP = 0{\cdot}42 \times PQ$.

NOTE — For a new last shape, the above procedure may be modified suitably by the testing laboratory if in their opinion the position obtained for measuring clearance is not a reasonable one.

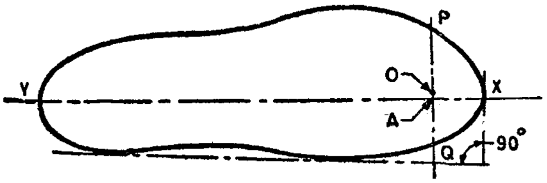


FIG. 3 POSITION FOR MEASUREMENT OF CLEARANCE INSIDE THE BOOT OR SHOE

D-3.1.1 The boot to be tested shall be drilled through the sole in such a manner that with the last in the boot, the drill comes through the insole at the point O on the last, and is approximately perpendicular to the surface of the last at the point. A suitable jig can be devised for this purpose.

D-3.2 Method of Measurement of Clearance at the Moment of Maximum Depression

A device capable of measuring the clearance, at the moment of maximum depression, between the insole and upper shall be fixed to the insole by means of a screw passing through the hole drilled in the position defined in **D-3.1.1**. A suitable measuring device is shown in Fig. 4.

D-4 PROCEDURE

D-4.1 Clamping of Boot

The boot, with the measuring device inserted, shall be tightly clamped so that it cannot move longitudinally or laterally, with its toe part on the flat horizontal steel plate. The angle of the boot shall be such that the forward 65 mm of the sole is judged by the operator to be on the average horizontal, and the boot shall be supported in this position by a wedge under the heel, the wedge being such that it supports only the heel and no part of the sole.

D-4.2 Position of Boot

The boot clamped as specified in **D-4.1** shall be positioned under the striking bar so that the measuring capsule is 10 mm behind the centre line of the bar. The bar shall rest on the boot with its longest direction roughly at right angles to the length of the boot.

D-4.3 Adjust the weight to a height of 508 ± 5 mm above the top of the vertical plunger as specified in **D-2.1** and allow it to fall freely. This gives the weight an impact of 14 kgfm as required in **6.2.2**. Measure the clearance inside the boot at the moment of maximum depression in millimetres and report as such.

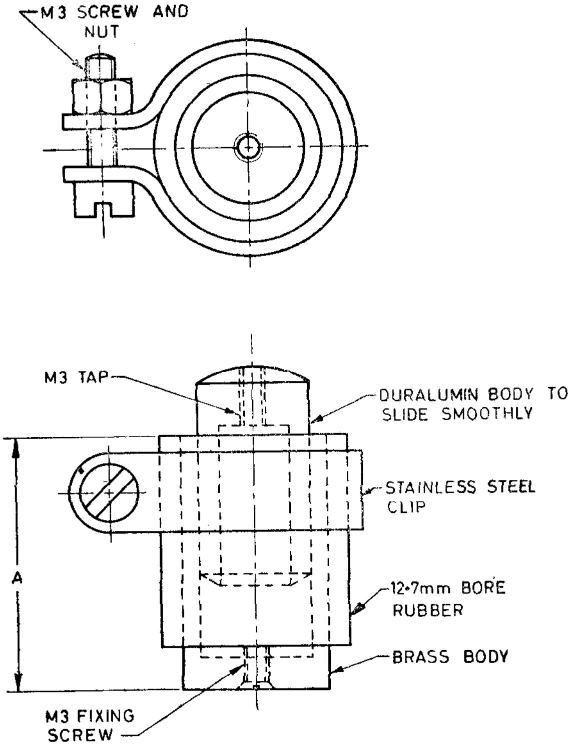


FIG. 4 CAPSULE FOR MEASURING THE CLEARANCE AT THE TIME OF MAXIMUM DEPRESSION

ANNEX E

(Foreword)

COMMITTEE COMPOSITION

Footwear Sectional Committee, CHD 019

Chairman	*Representing*
Shri S. K. Bhadra	Bata India Limited, Calcutta
Members	
Shri Krishanu Chatterjee (*Alternate* to Shri S. K. Bhadra)	
Shri Jane Alam	Council for Leather Exports, Kanpur
Shri M. P. Bajpai Shri K. K. Hajela (*Alternate*)	Tannery & Footwear Corporation of India Ltd, Kanpur
Shri A. Bandyopadhyay Shri B. B. Das (*Alternate*)	Ministry of Defence (R&D), Kanpur
Shri P. L. Banerjee Shri S. Banerjee (*Alternate*)	Glace Kid India Pvt Ltd, Calcutta
Shri S. Banerjee Shri K. S. Rama Rao (*Alternate*)	Madura Coats Limited, Madurai
Shri R. S. Balasubramanian Shri A. K. Basu (*Alternate*)	Export Inspection Council for India, Madras
Shri J. Basak	Bihar Rubber Company, Ranchi
Shri J. Chakraborti Shri Shib Kumar (*Alternate*)	Standing Committee for Safety in Steel Industry, Durgapur
Shri B. N. Das	Central Leather Research Institute, Madras
Shri B. Dutta Shri D. Dass (*Alternate*)	Bengal Waterproof Ltd, Calcutta
Shri S. Guha Shri S. R. Saha (*Alternate*)	Indian Leather Technologists Association, Calcutta
Shri Adrash Gupta	Liberty Footwear Co, Karnal
Shri Gautam Gupta Shri G. C. Kanaujiya (*Alternate*)	Ministry of Defence (DGQA), Kanpur
Shri R. S. Ghosh Shri D. Ray (*Alternate*)	Directorate General of Technical Development, New Delhi
Shri J. N. Johari Shri A. K. Rudra (*Alternate*)	Directorate General of Mines Safety, Dhanbad
Dr C. Koteswar Rao Shri V. M. Ashdhir (*Alternate*)	Bharat Leather Corporation Ltd, Agra
Shri V. Mehrotra Shri R. Subramanium (*Alternate*)	Tata Export Ltd, Dewas
Shri Subhash Mehta Shri M. N. Mathur (*Alternate*)	Sports Equipment Pvt Ltd, New Delhi
Shri U. S. Paul	Footform, Calcutta
Dr R. Panda Shri G. S. Lakhotia (*Alternate*)	National Engineering Industries, Calcutta
Shri C. S. V. Ramana Shri G. Gopalakrishna (*Alternate*)	Leather Industries Development Corpn of Andhra Pradesh Ltd, Hyderabad
Shri V. L. Shamveel Ahmed	Farida Shoe Co, Madras
Shri D. K. Seth Shri N. N. Debnath (*Alternate*)	Office of the Development Commissioner (SSI), New Delhi
Shri S. S. Shukla Shri A. P. Aggarwal (*Alternate*)	Steel Authority of India Ltd, Ranchi
Shri M. P. Vishwanathan	Corona Shoe Co, Bombay
Representative	Indian Rubber Institute, Calcutta
Dr R. K. Singh, Director (Chem)	Director General, BIS (*Ex-officio Member*)

Member Secretary

Shri P. Mukhopadhyay
Joint Director (Chem), BIS

(*Continued on page* 12)

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Industrial Safety and Special Purposes Footwear Subcommittee, CHD 019 : 04

Convener	*Representing*
Shri M. K. Malhotra	Directorate General of Factory Advice Services & Labour Institute, Bombay
Members	
Shri M. U. Fulekar (*Alternate* to Shri M. K. Malhotra)	
Shri R. S. Agarwal	Bata India Limited, Calcutta
Shri N. K. Ashar	TELCO, Pune
Shri P. N. Arora	Skolast India Pvt Ltd, Kanpur
Shri Bharat Bhushan (*Alternate*)	
Shri Balbir Singh	Hindustan Copper Ltd, Calcutta
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Shri B. Dutta	Bengal Water-Proof Ltd, Calcutta
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Dr C. Koteswara Rao	Bharat Leather Corporation Ltd, Agra
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Shri U. S. Paul	Footform, Calcutta
Shri M. Rafiullah	Tannery & Footwear Corporation of India Ltd, Kanpur
Shri V. N. Dixit (*Alternate*)	
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Shri Bhaskar Bhattacharya (*Alternate*)	
Shri S. S. Shukla	Steel Authority of India Ltd, Ranchi
Shri A. P. Aggarwal (*Alternate*)	
Shri Anil Taneja	Safewear Rubber Works, Nagpur
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